

WHAT IS CLAIMED IS:

1. A paper feeding apparatus of a printing machine, comprising:
  - a paper feeding tray for stacking a plurality of printing papers therein;
  - a pick-up unit having a pick-up roller which rotates at an upper part of the paper feeding tray to pick up the printing paper;
  - a knockup plate moving up and down in the paper feeding tray to contact the printing paper of the paper feeding tray with the pick-up roller to lift the printing paper;
  - a separation member for separating the printing paper picked up by the pick-up roller sheet by sheet;
  - a sensor for detecting a distance between the printing paper and the pick-up roller; and
  - a lifting device for lifting the knockup plate by a signal of the sensor to maintain a constant contacting status of the printing paper and the pick-up roller.
2. The paper feeding apparatus of claim 1, wherein the pick-up unit has one end for rotatably supporting the pick-up roller, and the other end rotatably supported on the main body frame of the printing machine, including a gear train for transmitting a driving force from a driving source to the pick-up roller.
3. The paper feeding apparatus of claim 1, wherein the knockup plate moves down by a self-weight.
4. The paper feeding apparatus of claim 1, further comprising:
  - an extension spring mounted at a bottom surface of the paper feeding tray to elastically support the knockup plate downward.
5. The paper feeding apparatus of claim 1, wherein the separation member has an arrangement part mounted substantially perpendicularly to the bottom surface of the paper feeding tray for aligning the printing paper stacked in the paper feeding tray when the knockup plate moves down, and a separation part extending from the arrangement part, having a predetermined angle and predetermined roughness.

6. The paper feeding apparatus of claim 1, wherein the separation member has a separation part of predetermined height and slanting angle, which extends from a spot where the top of the stacked printing paper meets the pick-up position with the knockup plate being in an up state, and has a predetermined roughness.

7. The paper feeding apparatus of claim 5, wherein the predetermined slanting angle is substantially between  $100^\circ$  and  $130^\circ$  with respect to the bottom surface of the paper feeding tray.

8. The paper feeding apparatus of claim 7, wherein the predetermined slanting angle is, or substantially is  $120^\circ$  with respect to the knockup plate at a paper pick-up position in which the knockup plate is lifted up.

9. The paper feeding apparatus of claim 5, wherein the separation member is integrally formed with the paper feeding tray.

10. The paper feeding apparatus of claim 1, wherein the sensor is a pressing sensor.

11. The paper feeding apparatus of claim 1, wherein the sensor is a proximity sensor.

12. The paper feeding apparatus of claim 1, wherein the lifting device comprises:

a motor which is the driving source;

a cam mounted at a side of a lower part of the knockup plate and rotating by the driving force from the motor to lift the knockup plate; and

a driving force transmitting means for deceleratingly transmitting the driving force of the motor.

13. The paper feeding apparatus of claim 12, wherein the driving force

transmitting means comprises:

- a worm disposed at a shaft of the motor;
- a worm wheel engaged with the worm;
- a deceleration gear having the same shaft as the worm wheel; and
- a cam gear disposed on a rotation shaft of the cam to be engaged with the deceleration gear.

14. A method of using a paper feeding apparatus of a printing machine having printing papers in a paper feeding tray comprising:

rotating a pick-up roller in a pick-up unit, the pick-up roller rotating at an upper part of the paper feeding tray to pick up the printing paper;

moving a knockup plate up and down in the paper feeding tray to contact the printing paper of the paper feeding tray with the pick-up roller to lift the printing paper;

separating the printing paper picked up by the pick-up roller sheet by sheet by a separation member;

detecting a distance between the printing paper and the pick-up roller by a sensor; and

lifting the knockup plate by a lifting device due to a signal of the sensor to maintain a constant contacting status of the printing paper and the pick-up roller.

15. The method of using a paper feeding apparatus of claim 14, wherein the pick-up unit has one end for rotatably supporting the pick-up roller, and the other end rotatably supported on the main body frame of the printing machine, including a gear train for transmitting a driving force from a driving source to the pick-up roller.

16. The method of using a paper feeding apparatus of claim 14, wherein the knockup plate moves down by a self-weight.

17. The method of using a paper feeding apparatus of claim 14, further comprising:

supporting elastically the knockup plate downward by an extension spring mounted at a bottom surface of the paper feeding tray.

18. The method of using a paper feeding apparatus of claim 14, further comprising:

aligning the printing paper stacked in the paper feeding tray when the knockup plate moves down by the separation member comprising an arrangement part mounted substantially perpendicularly to the bottom surface of the paper feeding tray, and a separation part extending from the arrangement part, having a predetermined angle and predetermined roughness.

19. The method of using a paper feeding apparatus of claim 14, wherein the separation member has a separation part of predetermined height and slanting angle, which extends from a spot where the top of the stacked printing paper meets the pick-up position with the knockup plate being in an up state, and has a predetermined roughness.

20. The method of using a paper feeding apparatus of claim 18, wherein the predetermined slanting angle is substantially between 100° and 130° with respect to the bottom surface of the paper feeding tray.

21. The method of using a paper feeding apparatus of claim 20, wherein the predetermined slanting angle is, or substantially is 120° with respect to the knockup plate at a paper pick-up position in which the knockup plate is lifted up.

22. The method of using a paper feeding apparatus of claim 18, wherein the separation member is integrally formed with the paper feeding tray.

23. The method of using a paper feeding apparatus of claim 14, wherein the sensor is a pressing sensor.

24. The method of using a paper feeding apparatus of claim 14, wherein the sensor is a proximity sensor.

25. The method of using a paper feeding apparatus of claim 14, wherein the lifting device comprises:

    a motor which is the driving source;  
    a cam mounted at a side of a lower part of the knockup plate and rotating by the driving force from the motor to lift the knockup plate; and  
    a driving force transmitting means for deceleratingly transmitting the driving force of the motor.

26. The method of using a paper feeding apparatus of claim 25, wherein the driving force transmitting means comprises:

    a worm disposed at a shaft of the motor;  
    a worm wheel engaged with the worm;  
    a deceleration gear having the same shaft as the worm wheel; and  
    a cam gear disposed on a rotation shaft of the cam to be engaged with the deceleration gear.